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Dishonest and excessive use of antibiotics in meat producing animals in Bangladesh: a regulatory review

Abu Noman Mohammad Atahar Ali
University of Wollongong, anmaa@uow.edu.au

S M. Solaiman
University of Wollongong, sheikh@uow.edu.au

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Abstract

The article aims to bring about regulatory reforms concerning excessive use of medically important antimicrobials (MIA) on meat producing animals (MPA) in Bangladesh. An excessive use of MIA with a dishonest motive of artificially fattening animals including poultry chickens has been commonplace in Bangladesh. The usage of MIA in such a manner has the potential to create antimicrobial resistant infections in the animals, which can be transmitted to humans through food, direct contact with MPA or even via environmental spread. Such a transmission has already massively occurred in Bangladesh. In formulating recommendations, we critically analyse the existing regulatory functions and employ both empirical and doctrinal methods of analysis. Our empirical research reveals that the regulatory laxity, profit motive, and ignorance of antibiotics users and meat consumers about the latent harm are major factors contributing to the unsafe use of MIA. To address these factors, we submit eleven specific recommendations for necessary reforms.

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Dishonest and Excessive Use of Antibiotics in Meat Producing Animals in Bangladesh: A Regulatory Review

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The article aims to bring about regulatory reforms concerning excessive use of medically important antimicrobials (MIA) on meat producing animals (MPA) in Bangladesh. An excessive use of MIA with a dishonest motive of artificially fattening animals including poultry chickens has been commonplace in Bangladesh. The usage of MIA in such a manner has the potential to create antimicrobial resistant infections in the animals, which can be transmitted to humans through food, direct contact with MPA or even via environmental spread. Such a transmission has already massively occurred in Bangladesh. In formulating recommendations, we critically analyse the existing regulatory functions and employ both empirical and doctrinal methods of analysis. Our empirical research reveals that the regulatory laxity, profit motive, and ignorance of antibiotics users and meat consumers about the latent harm are major factors contributing to the unsafe use of MIA. To address these factors, we submit eleven specific recommendations for necessary reforms.

Keywords: Meat producing animal, antibiotics, antimicrobial resistance in Bangladesh, prohibition, regulation.

I. Introduction

The genesis of the usage of medically important antibiotic (MIA) dates back to the early 19th century when the United States (US) experienced a meat scarcity generating consumer demand for undertaking research aimed at increasing meat production.[1] Accordingly, the US government of the day began investing money for research. As the panacea, the groundbreaking research of Moore et al.[2] on antibiotic use suggested that '[s]ulfasuxidine and streptomycin singly or in combination lead to increased growth responses in chicks, receiving our basal diet supplemented with adequate amounts of folic acid'. This finding triggered further researches[3] using other antibiotics on MPA, and all of them were very successful. In particular, farmers applauded a declaration by the New York Laboratory in 1950

[1] P. R. Moore, A. Evenson, T. D. Luckey et al., "Use of Sulfasuxidine, Streptothricin, and Streptomycin in Nutritional Studies with the Chick", 165 *Journal of Biological Chemistry* (1946), pp. 437 *et sqq.*, at p. 437.
[2] *Ibid.*
[3] For example, see E. L. R. Stokstad, Thomas H. Jukes, J. Pierce, A. C. Page Jr, & ANDA L. Franklin, "The Multiple Nature of the Animal Protein Factor", 180 *Journal of Biological Chemistry* (1949). pp. 647-654; E.E. Bartley, F. C. Fountains & F.W. Atkeson, "The Effect of an APF Concentrate Containing Aureomycin on the Growth and Well-being of Young Dairy Calves", 9 *Journal of Animal Science* (1950), pp. 646-647; Tony J. Cunha, G. B. Meadows, H. M. Edwards, R. F. Sewell, C. B. Shawver, A. M. Pearson, & R. S. Glasscock, "Effect of Aureomycin and Other Antibiotics on the Pig", 9 *Journal of Animal Science* (1950), pp. 653-654; J. K. Loosli & H. D. Wallace, "Influence Of APF and Aureomycin on the Growth of Dairy Calves", 75 *Proceedings of the Society for Experimental Biology and Medicine* (1950), pp. 531-533.

that use of antibiotics on the poultry would significantly augment meat production in the US.[4] The 1950 pronouncement marked the beginning of the commercial use of antibiotics to increase meat production, even though Moor et al.'s Research attracted extensive debates soon after its publication, which remained alive to date. For example, Starr & Reynold[5] experimentally proved by feeding of streptomycin to turkeys that the use of antibiotics was causing resistance in those animals. Subsequently, Barnes[6] and Elliott & Barnes[7] reaffirmed that antibiotic use in MPA causes antibiotic resistance, which can be transmitted from animals to humans.[8]

Antimicrobial resistance (AMR)[9] has now become a global phenomenon, the threat of which is growing alarmingly, and the situation is perhaps relatively worse in developing countries due to unfettered misuse of antimicrobials.[10] The magnitude of AMR consequences is probably best evident in the United Nations Interagency Coordination Group (IACG) on Antimicrobial Resistance report 2019 which discloses that an estimated 10 million deaths will occur worldwide each year by 2050, owing to AMR which is significantly higher than the current yearly estimated casualties of 700,000 human lives.[11] WHO backs up the apprehension in its report[12] by recognizing that AMR has been a global crisis with the capability of endangering people's lives that may be triggered even from aggravation of easily curable infections.[13] Consistently, Britain's Chief Medical Officer Dame Sally Davies in

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[4] Claas Kirchhelle, "Pharming Animals: A Global History of Antibiotics in Food Production (1935–2017)", Nature, 7 August, 2018) available on the Internet at: <https://www.nature.com/articles/s41599-018-0152-2> (last accessed on 10 August 2020).

[5] Mortimer P. Starr & Donald M. Reynolds (1951), "Streptomycin Resistance of Coliform Bacteria from Turkeys Fed Streptomycin", 41 *American Journal of Public Health and the Nations Health* (1951), pp. 1375-1380.

[6] Ella M. Barnes, "The Effect of Antibiotic Supplements on the Faecal Streptococci (Lancefield Group D) of Poultry, 114 *British Veterinary Journal* (1958), pp. 333-344.

[7] S. D. Elliott & Ella M. Barnes, "Changes in Serological Type and Antibiotic Resistance of Lancefield Group D Streptococci in Chickens Receiving Dietary Chlortetracycline", 20 (2) *Microbiology* (1959), pp. 426-433.

[8] C. Greko, "Safety Aspects on Non-Use of Antimicrobials as Growth Promoters", in A. Piva, K. E. Bach Knudsen & JE Lindberg (eds.), *Gut Environment of Pigs*, (Nottingham, UK: Nottingham University Press, 2001), pp. 219-230.

[9] The AMR has been defined as 'the result of microorganisms changing in ways that reduce or eliminate the effectiveness of drugs, chemicals, or other agents used to cure or prevent infections': CDC, "Antibiotic Resistance Threats in the United States" (2013), available on the Internet at <https://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf>, at p. 107.

[10] C A Hart & S Kariuki, "Antimicrobial Resistance in Developing Countries", 317 *BMJ* (1998), pp. 647-650, at p. 647; D. K. Byarugaba, "Antimicrobial Resistance in Developing Countries and Responsible Risk Factors", 24(2) *International Journal of Antimicrobial Agents* (2004), pp. 105 *et sqq.*, at p. 105; James A. Ayukekbong, Michel Ntemgwa & Andrew N. Atabe, "The Threat of Antimicrobial Resistance in Developing Countries: Causes and Control Strategies", 6(1) *Antimicrobial Resistance & Infection Control* (2017), pp. 1-8.

[11] WHO, " No Time to Wait: Securing the Future from Drug-Resistant Infections: Report to the Secretary-General of the United Nations, April 2019, available on the Internet at <https://www.who.int/antimicrobial-resistance/interagency-coordination-group/IACG_final_report_EN.pdf> (last accessed on 9 August 2020).

[12] WHO, "Global Priority List of Antibiotic-Resistant Bacteria to Guide Research, Discovery, and Development of New Antibiotics" 27 February 2017, available on the Internet at <https://www.who.int/medicines/publications/global-priority-list-antibiotic-resistant-bacteria/en/> (last accessed on 11 January 2020).

[13] Tharanga Yakupitiyage, "Preventing Antibiotic Resistance: Look to the Livestock Industry", Inter Press Service News Agency, 21 May 2019, available on the Internet at <http://www.ipsnews.net/2019/05/preventing-antibiotic-resistance-look-livestock-industry/>; WHO, "WHO Global Strategy for Containment of Antimicrobial Resistance", 2001, available on the Internet at, <https://www.who.int/drugresistance/WHO_Global_Strategy_English.pdf> (last accessed on 9 August, 2020).

2013 warned of the dire consequence of antibiotic excessive use and resultant AMR, whilst he publicly termed AMR as a 'ticking time bomb'.[14] Davies warned British MPs and asked the UK government for inclusion of AMR issue in the National Risk Register of Civil Emergencies accepting it as 'a national emergency comparable to a catastrophic terrorist attack, pandemic flu or major coastal flooding'.[15]

Ever since the discovery of penicillin as the first commercialized antibiotic in 1928, the invention of new antibiotics has paralleled the detection of resistance, giving the germs ways to survive and 'making it harder for us to keep up'.[16] Unfortunately, the modern medical science seems to be failing to surpass the effects of AMR by discovering new antibiotics, resulting in the ineffectiveness of life-saving medications.

Generally, there are four grounds for using antibiotics in MPA: (i) immediate therapeutic treatment; (ii) short-term medication to prevent infection and contain disease spread; (iii) aversion of food chain contamination; and finally (iv) economic gains (i.e., growth promotion).[17] Ironically, the last one comes first when MIA applies to animals in Bangladesh, where a large number of farmers (individually or collectively in farms) use antibiotics in animals through feeds and injections for fattening purposes, contributing to the prevalence of AMR,[18] posing an unassailable threat to public health, which has been a critical concern of the 'One Health Initiative of Bangladesh'[19] – a new concept to be discussed later in this article.

The present research portrays the existing deplorable rates of AMR shown by the clinically significant pathogens caused by alarming extent of overuse of antibiotics in animals with an utterly ill commercial motive. It discusses the legal and regulatory laxities in overseeing the misuse of MIA in the country, submits recommendations for redressing the problems associated with the usage of MIA in MPA. The recommendations aim to provide guidance for policymakers, professionals, farmers and traders to carefully minimize the usage of such medications and immediately stop their misuse for

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[14] Fergus Walsh, "Antibiotics Resistance 'As Big A As Terrorism'—Medical Chief", BBC News, 11 March 2013, available on the Internet at, <https://www.bbc.com/news/health-21737844> (last accessed on 9 August, 2020).

[15] Ian Sample, "Antibiotic-Resistant Diseases Pose 'Apocalyptic' Threat, Top Expert Says", The Guardian, 23 January 2013, available on the Internet at <https://www.theguardian.com/society/2013/jan/23/antibiotic-resistant-diseases-apocalyptic-threat> (last accessed on 9 August 2020).

[16] CDC, "About Antimicrobial Resistance" available on the Internet at <https://www.cdc.gov/drugresistance/about.html> (last accessed on 11 August 2020).

[17] Sarah C. Alvy, "How the FDA Can Strengthen Governing Antibiotic Use in Food-Producing", 6(2) *Journal of Animal & Environmental Law* (2015), pp. 1 *et sqq.*, at p. 9.

[18] Iftekhar Ahmed, Md. Bodiuzzaman Rabbi & Sakina Sultana, "Antibiotic Resistance in Bangladesh: A Systematic Review, 80 *International Journal of Infectious Diseases* (2019), pp. 54 *et sqq.*, at p. 54, 54, 59.

[19] IEDCR, "Interface - A One Health Newsletter", 11 June 2018, available on the Internet at <https://www.iedcr.gov.bd/pdf/files/One%20Health/Health%20News%20Letter%20-11-06-2018%20MMH%20edited.compressed.pdf> at p. 1 (last accessed on 16 January 2020).

illegal and unethical financial gains at the expense of human life. This article aims to facilitate realization of these positive outcomes mainly through strengthening regulation, elimination of legal loopholes and creation of public awareness against the harm which is being caused by the malpractice and misuse of MIA.

II. Why Farmers Use Antibiotics in Meat Producing Animals in Bangladesh

1. Fattening Meat Producing Animals

Antimicrobial should be used in animal production ideally for the prevention or treatment of clinically infectious bacterial diseases, whilst it is also applied as sub-therapeutic use to improve feed efficiency and stimulate animal growth.[20] However, the practice of medical treatment of sick animals has not yet flourished in Bangladesh, as farmers largely rely on herbal remedies. Hence farmers' motivation for using MIA comes predominantly from increasing financial gains by fast fattening their MPA that will attract customers. Antibiotics have the potential to reduce feed requirements and escalate weight gain by 2-15%.[21] The New York Times in a 2018 report mentioned that use of antibiotics in animals can reduce the time up to 50% to get them ready for slaughterhouse.[22] According to the surveillance and animal production data, the benefits of antibiotics as growth-escalators are found to be minimal when animals are reared in hygienic conditions, thus antibiotics are used to compensate the adverse effects of unhealthy conditions and improper health management of animals.[23] This situation is even more unacceptable.

According to a study conducted in 2012, a total of 63.7% of animal farmers in Bangladesh use the prohibited cattle-fattening tablets to inflate their livestock in breach of law.[24] Animals get fatty from the accumulation of fluid in their bodies caused by steroids. Unscrupulous farmers and traders in

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[20] R. Chowdhury, M. N. Haque, K. M. S. Islam and A. B. M. Khaleduzzaman, "A Review on Antibiotics in an Animal Feed", 38 *Bangladesh Journal of Animal Science* (2009), pp. 22 *et sqq.*, at p. 23.

[21] Haihong Hao, Guyue Cheng, Zahid Iqbal, Xiaohui Ai , Hafiz I. Hussain, Lingli Huang, Menghong Dai,YulianWang, Zhenli Liu and ZonghuiYuan, "Benefits and Risks of Antimicrobial Use in Food-Producing Animals", 5 *Frontiers in Microbiology* (2014), pp. 1-11, at p. 3; see also Delia Grace, *Review of Evidence on Antimicrobial Resistance and Animal Agriculture in Developing Countries*, (UK: Evidence on Demand 2015) at p. 10.

[22] William D. Cohan, "Antibiotics in Meat Could Be Damaging Our Guts: The F.D.A. Banned the Use of Antibiotics for Growth Promotion in Animals Last Year. One Organic Cattle Farmer is Sure the Ban is Being Flouted", New York Times, 25 May 2018, available on the Internet at <https://www.nytimes.com/2018/05/25/opinion/sunday/meat-antibiotics-organic-farming.html> (last accessed on 11 August 2020).

[23] WHO, "The Medical Impact of Antimicrobial Use in Food Animals. Report of a WHO Meeting. Berlin, Germany, 13-17 October 1997", available on the Internet at <https://apps.who.int/iris/bitstream/handle/10665/64439/WHO_EMC_ZOO_97.4.pdf;jsessionid=3AD4967D994CF1B728B712329FF402FA?sequence=1> at p. 2 (last accessed on 11 August 2020); Peter J. Collignon & Scott A. McEwen, "One Health - Its importance in Helping to Better Control Antimicrobial Resistance", 4(1) *Tropical Medicine and Infectious Disease* (2019), pp. 1, *et sqq.*, at p. 3.

[24] Pinaki Roy & Ahmed Kabir Topu, "Cow Fattening out of Control: Traders Cut Long Process Short With Help of Harmful Drugs", The Daily Star, 29 September 2014, available on the Internet at <https://www.thedailystar.net/cow-fattening-out-of-control-43802> (last accessed on 11 August 2020); Mohammad Al-Masum Molla, "Poultry Feed Laced with Antibiotics", The Daily Star, 13 April 2019, Front page.

Bangladesh extensively increase the misuse of MIA in order to fatten their oxen, cows and goats overnight for selling their animals at a higher price especially before the Eid-ul-Adha, a yearly religious festival requiring animal sacrifice.[25] We have visited randomly 50 MPA farms (mainly poultry, oxen, cow and turkey) from January 2019 to September 2019 to collect primary data from farmers of their MPA through unstructured quantitative interviews[26] from different districts in Bangladesh. Our empirical search finds that 44 of the 50 farms, forming 93% of the total sample, use antibiotics in their MPA for growth enhancement. This is a huge concern for public health. Anecdotally, one of the authors of this article fell victim of such a farmer's malpractice by buying a large ox at a high price from the market for the aforesaid religious sacrifice of animal in 2019, as its meats were distasteful and appeared to be poisonous. Both the empirical data and the anecdote consistently demonstrate the severe extent of the problem surrounding MIA misusage in MPA in the country.

2. Producing More Meat by Adding Additional Protein

Some commentators argue that the rapid growth of animal agriculture in intensive environments required feeding of veterinary drugs to MPA to meet the increasing human demand for livestock and fish products to consume necessary protein by the ever-increasing global population in their pursuit of improved living standards.[27] Surveys conducted by Directorate of Livestock (Bangladesh) demonstrate significant increase in the production of meat and milk from 2010 to 2018.[28] Meat production increased from 1.99 million to 7.26 million metric tons to meet the soaring demand of consumers. This is also evident from the phenomenal augmentation in milk production from 2.95 metric tons to 9.40 metric tons during the aforesaid period (2010-2018); nonetheless a deficiency of 5.62 million metric tons remains.[29] Hence, it is conceivable that the demand-supply mismatch has played a decisive role in tempting farmers to begin the misapplication of MIA, however about 80% of animals cultivated for meat consumption are now unacceptably and harmfully subjected to medication.[30] Such

[25] Roy & Topu, "Cow Fattening", *supra* note 24.
[26] "The chief feature of the unstructured interview is to reveal information from the respondent in a more neutral environment with less attached bias from the interviewer." Ann Bowling, *Research Methods in Health: Investigating Health and Health Services*, (United Kingdom: McGraw-Hill Education), at p. 398. As for unstructured interview, the researcher does not usually frame questions in any specific sequence or in predetermined words before conducting the interview. P. Gill, K. Stewart, E. Treasure and B. Chadwick, "Methods of Data Collection in Qualitative Research: Interviews and Focus Groups", 204(6) *British Dental Journal* (2008), pp. 291, *et sqq.*, at p. 291. The unstructured quantitative interview method has been used for this research to collect the information from the farmers in an informal discussion. It was told to the farmers that their names and identities would be anonymous to the law enforcing agencies since the antibiotic use has been banned in the country.
[27] Grace, *Review of Evidence on Antimicrobial Resistance*, *supra* note 21, at p. 1.
[28] Directorate of Livestock, "Livestock Economy at a Glance, DLS, Government Of Bangladesh (2017-18)", available on the Internet at <http://dls.portal.gov.bd/sites/default/files/files/dls.portal.gov.bd/page/ee5f4621_fa3a_40ac_8bd9_898fb8ee4700/Livestock%20Economy%20at%20a%20glance%20%20%282017-2018%29.pdf> (last accessed on 20 November 2019).
[29] *Ibid.*
[30] Chowdhury et al, "A Review on Antibiotics", *supra* note 20, at p. 23.

a magnitude of misuses is also evident in the market price of MIA, as the global market price for veterinary medicines, including antimicrobial jumped from US$8.65 billion in 1992 to US$20.1 billion in 2010.[31] It means people are buying, applying, producing and selling poisons in different forms chiefly for money in the disguise of meeting increasing demand for meats, which is simply unjustified and dreadful.

3. Lacking Knowledge of the Harmful Effect of AMR and Its Transmission into Humans

Animal husbandry practices in Bangladesh, a low-income developing country, are unhealthy on various counts compared to those in the developed economies. These practices include: (i) sharing natural waters for drinking and bathing by both animals and humans; (ii) using animal wastes as fish feeds or fertilizers for farming; (iii) leaving animals free to move around the roads and sometimes marketplace allowing them to come closure to people unprepared to handle those strangers safely; (iv) housing animals sometimes in confined spaces with humans under the same roof for night times to prevent thefts; (v) living of the poultry farm workers and their families in an environment which makes them more susceptible to carry antibiotic-resistant microbes and zoonotic diseases compared to the corresponding environment in developed countries.[32] Such practices can easily transmit harm to humans who generally remain unaware of the true reason for their sickness, sometimes until death.

More worryingly, many farmers are not even aware of the fact that there are dangers associated with antibiotics use, let alone having the knowledge to improve their animal agricultural practices to avoid susceptibility to AMR. Making the situation even worse, MIA substances are used in all animals indiscriminately in an overly densely populated large flock, although only a few of them had been ill.[33] This exercise has a higher likelihood of developing AMR, given that the medication is used in confined spaces of farms with a poor sanitation facility.[34] As the farmers lack the knowledge of its harmful effects, they get affected unknowingly in most cases. This inference is supported by our empirical inquiry which finds that more than half of the farmers among 50 large MPA farms do not

[31] In 2012 the Global Industry Analysts [hereinafter GIA] projected that the global animal medication market might reach US$42.9 billion by 2018. GIA, "Animal Health Market to Hit $43 Billion in Five Years", 13 August 2012, available on the Internet at <http://westernfarmpress.com/management/animal-health-market-hit- 43-billion-five-years> (last accessed on 17 January 2020); Hao et al., "Benefits and Risks", *supra* note 21, at p. 1; Yuanan Hua & Hefa Cheng, "Health Risk from Veterinary Antimicrobial Use in China's Food Animal Production and Its Reduction", 219 *Environmental Pollution* (2016), pp. 993, *et sqq.*, at p. 993.

[32] A. A. Roess, P. J. Winch, A. Akhter, D. Afroz, N. A. Ali, R. Shah, N. Begum, H. R. Seraji, S. El Arifeen, G. L. Darmstadt, A. H. Baqui, and the Bangladesh Projahnmo Study Group, "Household Animal and Human Medicine Use and Animal Husbandry Practices in Rural Bangladesh and Human Medicine Use and Animal Husbandry Practices in Rural Bangladesh: Risk Factors for Emerging Zoonotic Disease and Antibiotic Resistance", 62 *Zoonoses and Public Health* (2015), pp. 569, *et sqq.*, at p. 569, 570.

[33] Vangelis Economou & Panagiota Gousia, "Agriculture and Food Animals as a Source of Antimicrobial-resistant Bacteria", 8 *Infection and Drug Resistance* (2015), pp. 49 *et sqq.*, at p. 49, 50.

[34] Emily K. Rousham, Leanne Unicomb & Mohammad Aminul Islam, "Human, Animal and Environmental Contributors to Antibiotic Resistance in Low-Resource Settings: Integrating Behavioural, Epidemiological and One Health Approaches", 285 *Proceedings of the Royal Society of B-biological Science* (2018), pp. 1 *et sqq.*, at p. 1, 2.

possess adequate knowledge about the health risk of such an indiscriminate usage of MIA. This ignorance is partly attributable to the fact that Bangladeshi farmers are not literate enough to consider and assess the harmful consequences of the residual effects of overexposure to antimicrobial drugs.[35]

Apart from framers, consumers in general are also unaware of the prevalence and health impacts of using MIA in MPA in Bangladesh, as is typically the case with other developing countries.[36] Public awareness could make a difference on the demand side, as noticed in the aftermath of a recent publicity of the presence of antibiotics, lead and cadmium in 14 major dairy brands of pasteurised milk in the country.[37] A recent study employing scientific tests conducted by the National Food Safety Laboratory in collaboration with Food and Agriculture Organization (FAO) finds that 96% of the sampled dairy products collected from different places (six sub-districts/upazilas) had high microbial contaminants.[38] An extensive publicity of this finding through national press and electronic media in early 2019 generates appreciable consciousness among the country's urban-residents contributing to a decline in milk consumption.[39] This consumer-responsiveness has a downside as well, because while transmission of these antibiotics-infested meats and dairies into human bodies is likely to worsen a public health crisis through AMR, a complete rejection of these vital food items would cause a nutrition deficiency, giving birth to yet another health problem.

4. Lacking of Proper Monitoring

Admittedly, developing countries in general have limited resources to oversee and control the sale of veterinary drugs,[40] and Bangladesh is no exception. Taking advantage of lack of adequate monitoring, antimicrobials are used in most cases avoiding any veterinary surveillance in Bangladesh. We visited ten local pharmacies randomly and asked questions in the form of informal interviews, whether or not they check prescriptions before selling MIA. Not surprisingly, all of the pharmacies we contacted confirmed that they sell MIA regardless of presenting prescriptions by customers, and they have no sense of wrongdoing in selling such medications without a valid prescription. The Project to Advance the Health of Neonates and their Mothers (PROJAHNMO), a three-year trial to evaluate the impact of a package of obstetric and neonatal care including community health education, conducted in-depth semi-structured interviews of Bangladeshi rural MPA farmers for their empirical study. Their study finds that the same unlicensed and untrained person (in most cases, a drug seller pretending to be a doctor) provides health-care services to both humans and animals, and they are usually involved

[35] Chowdhury et al, "A Review on Antibiotics", *supra* note 20, at p. 26.
[36] Grace, *Review of Evidence on Antimicrobial Resistance*, *supra* note 21, at p. 17.
[37] Ahmed Alam & Saidun Nabi, "Milk Consumption Decreases", Dhaka Tribune, 20 July 2019, Bangladesh page.
[38] *Ibid*.
[39] *Ibid.*
[40] Grace, *Review of Evidence on Antimicrobial Resistance*, *supra* note 21, at p. 13.

in treating both the household members and their animals in rural areas.[41] Untrained local health practitioners in rural areas are generally inclined to prescribe unnecessarily many antibiotics with an assumption that if one item does not work, the other will – thereby they try to protect their reputation and retain public confidence; and they do so even for negligible sickness such as, treating bacterial infections, vitamin deficiencies or for a growth spurt in livestock.[42] In fact, the rural farmers rely on those untrained practitioners until the situation gets noticeably worse, and they consult trained veterinarian only at the last stage making it extremely difficult for the qualified vet to successfully treat the animals.[43]

Our empirical findings conform to the dominance of the previously mentioned irregularities. We have visited several farms, and found that the farms located particularly in remote rural areas frequently use antibiotics feed, absent any meaningful regulatory attention. The lack of government monitoring bodies incentivizes most farmers of Chuadanga, Jhenidah, Nilphamari, Barisal, Faridpur, Manikganj, Sirajgong, Pabna districts along with many other districts of Bangladesh to blatantly infringe prohibitions, making use of the massive quantity of fattening tablets smuggled from neighboring India that are sold openly at meagre prices at local drugstores (black market).[44] The situation is so unacceptable that the High Court Division of the Supreme Court of Bangladesh on 16 July 2019 imposed ban on administering antibiotics to cows without valid prescriptions from veterinarians.[45] The High Court Division also directed the sellers to refrain from serving antibiotics to their animals without prescription.[46] So it can be concluded that these irregularities on both side of the critical medical service have been happening for decades, mirroring a great extent of public ignorance and absence of adequate monitoring system in the country. The situation is getting gradually worse.

III. The Consequences of Using Antibiotics in Meat-Producing Animals

1. An Alarming Spread of Antibiotic Resistance

The most pressing concern of unregulated antibiotic use is the emergence and spread of AMR in environmental bacteria which threatens the effective prevention and treatment of infectious diseases caused by bacteria, parasites, viruses and fungi.[47] Although the misuse of therapeutic antibiotics in

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[41] Amira A. Roess, Peter J. Winch, Nabeel A. Ali, Afsana Akhter, Dilara Afroz, Shams El Arifeen, Gary L. Darmstadt, Abdullah H. Baqui, for the Bangladesh PROJAHNMO Study Group, "Animal Husbandry Practices in Rural Bangladesh: Potential Risk Factors for Antimicrobial Drug Resistance and Emerging Diseases", 89(5) *The American Journal of Tropical Medicine and Hygiene* (2013), pp. 965, *et sqq*., at p. 967.
[42] Jakia Ahmed, "The Antibiotic Death Trap", Dhaka Tribune, 29 June 2017, Health & Wellness page.
[43] Roess et al., "Animal Husbandry Practices", *supra* note 42, at p. 967.
[44] Roy & Topu, "Cow Fattening", *supra* note 24.
[45] M. Moneruzzaman, "HC Bans Antibiotics for Cows Without Prescription", New Age, 16 July 2019, Bangladesh page.
[46] Law Desk, "An Overview of the Animal Welfare Act 2019", The Daily Star, 15 October 2019, Law & Our Rights page.
[47] WHO, "Antimicrobial Resistance", 15 February 2018, available on the Internet at <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance> (last accessed on 11 August 2020).

animals had been the key factor linked to the inception of the problem of antibiotic resistance in human medicine, several published reports demonstrate the use for growth promotion mainly in animal farming had a significant contribution to this harm.[48] The AMR is a growing threat to public health as resistance among zoonotic pathogens (e.g., Salmonella, Campylobacter, Yersinia, and some strains of E. coli, such as serotype O157:H7) has the great probability of its subsequent transfer from animals to animal products and then to humans and the ecosystem through the food processing and supply chains.[49] A study of the Health Ministry of Bangladesh discovers that gut microbes in both human and chicken share 36 mobile resistant genes capable of being transferred to other animals, human and the surroundings.[50] So the spread of antibiotic resistance is a matter of genuine concern.

2. Antibiotics Turning Ineffective

Bangladesh houses a widespread antibiotic-resistant microbial reservoir, thanks to the over-the-counter sales of antibiotics and their misuses. For example, pseudomonas aeruginosa, the primarily responsible bacteria for infections related to wound, urine, ear, and throat displays resistance to over 50 % antibiotics that are commonly used in Bangladesh.[51] They further stress that antibiotics namely, ceftriaxone, cefixime, and azithromycin, have been found to be absolutely (100%) ineffective against infections in urine, ear, and throat. More specifically a recent study[52] found that antibiotics (ciprofloxacin) did not work on typhoid patients in the second-line therapy (ciprofloxacin) whilst the existence of AMR prevented the physicians from attempting the first-line therapy in Bangladesh. More frustratingly, according to a study on children in a rural area of the country, 50% of the surveyed patients were found to have enteric flora resistant to ampicillin, cotrimoxazole, and streptomycin all over the year.[53] All this demonstrates the severity of the AMR problem prevailing in Bangladesh.

3. Persistent Deterioration of Public Health

Consumers of poisonous meats fattened with drugs are bound to have severe health impairments, which may lead to cancer and kidney failure in some instances.[54] One of the most comprehensive formal researches of AMR in the world conducted by the UK government in 2016 alarmed that AMR

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[48] Chowdhury et al, "A Review on Antibiotics", *supra* note 20, at p. 23, 24.
[49] Scott A. McEwen & Paula J. Fedorka-Cray, "Antimicrobial Use and Resistance in Animals", 34 *Clinical Infectious Diseases* (2002), pp. S93 *et sqq*., at p. S99.
[50] IEDCR, "Interface", *supra* note 19, at p. 3.
[51] Aliya Rashid, Akhtaruzzaman Chowdhury, Sufi HZ Rahman, Shahin Ara Begum, Naima Muazzam, "Infections by Pseudomonas aeruginosa and Antibiotic Resistance Pattern of the Isolates from Dhaka Medical College Hospital", 1(2) *Bangladesh Journal of Medical Microbiology* (2007), pp. 48 *et sqq*., at p. 48-51; Md. Abul Faiz & Ariful Basher, "Antimicrobial Resistance: Bangladesh Experience", 15 *Regional Health Forum* (2011), pp. 1 *et sqq* at p. 2.
[52] Ahmed, Rabbi & Sultana, "Antibiotic Resistance in Bangladesh", *supra* note 18.
[53] K. Z. Mamun, P. Shears and C. A. Hart, "The Prevalence and Genetics of Resistance to Commonly Used Antimicrobial Agents in Faecal Enterobacteriaceae from Children in Bangladesh", 110(3) *Epidemiology and Infection* (1993), pp. 447 *et sqq*., at p. 450; Faiz & Basher, "Antimicrobial Resistance", *supra* note 52, at p. 5.
[54] Roy & Topu, "Cow Fattening", *supra* note 24.

related diseases cause 700,000 deaths every year worldwide, [55] and the figures are expected to rise to over 10 million by 2050, which is bigger than the total number of deaths from cancer, diabetes and diarrheal diseases in 2018.[56] According to a study conducted by Poribesh Bachao Andolon (a Dhaka-based environmental NGO), a total 55.7% of the residents of Dhaka City have developed resistance to antibiotics, and it is predicted that if the misuse of MIA remains unregulated, antibiotics resistance will account for the country's leading source of death by 2050.[57]

The enormity of the danger of AMR to public health is further evidenced by the report that around 80% of the deaths in the ICU of the hospital of Bangabandhu Sheikh Mujib Medical University (BSMMU) — the first medical university of the country, are caused by bacterial or fungal infections that could not be treated due to micro-organism's insensitivity towards antibiotics.[58] The report adds that resistant bugs are the underlying reasons for 70% of total deaths across all ICUs in Bangladesh.[59] The higher percentage of deaths at MSMMU situated in the capital city may be attributable to MIA usage in MPA in that the city dwellers generally have better financial solvency than their rural counterparts, enabling the former to consume more rich foods compared to the latter. Consistent with the reports referred to, medical experts of the International Centre for Diarrheal Disease Research, Bangladesh (ICDDRB) warn that 'irrational use of antibiotics in animal feeds, especially in poultry farms, have scaled up the fear of AMR spreading in the country'.[60]

About 88% of diarrheal diseases account for poor sanitation and unclean water supplies in developing countries, especially children under five, fall prey to life-threatening infections due to resistance among entero-pathogens, and they frequently encountered particularly Escherichia coli (E-coli) which is notorious for being the most influential causative agent for such diseases.[61] UNICEF reported, 'diarrhoea is a leading killer of children, accounting for approximately 8% of all deaths of children under age 5 worldwide in 2017. This translates to over 1,300 young children dying each day,

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[55] Jim O'Neill, "Tackling Drug-Resistant Infections Globally: Final Report and Recommendations: The Review on Antimicrobial Resistance", Report Commissioned by the UK Prime Minister, May 2016, available on the Internet at <https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf>, at p. 1, 4, 11 (last accessed on 11 August 2020); for details on the AMR related concerns worldwide, see also Olga Jonas *et al.*, "Final Report: Drug-Resistant Infections: A Threat to Our Economic Future", World Bank Group, March 2017, report available on the Internet at <http://documents1.worldbank.org/curated/en/323311493396993758/pdf/final-report.pdf> (last accessed on 11 August 2020).

[56] Joe Wallen, "Superbugs Linked to Eight Out of 10 Deaths in Bangladeshi ICUs", The Telegraph, 22 April 2019, available on the Internet at <https://www.telegraph.co.uk/news/2019/04/22/superbugs-linked-eight-10-deaths-bangladeshi-icus/> (last accessed on 11 August 2020).

[57] Ahmed, "The Antibiotic", *supra* note 43.

[58] Wallen, "Superbugs Linked", *supra* note 57.

[59] *Ibid.*

[60] Kamrul Hasan, "Antibiotic Resistance Crisis Deepens in Bangladesh", Dhaka Tribune, 12 July 2019, Bangladesh page.

[61] Prabhat Kumar Talukdar, Mizanur Rahman, Mahdia Rahman, Ashikun Nabi, Zhahirul Islam, M Mahfuzul Hoque, Hubert P Endtz, Mohammad Aminul Islam, "Antimicrobial Resistance, Virulence Factors and Genetic Diversity of *Escherichia Coli* Isolates from Household Water Supply in Dhaka, Bangladesh", 8(4) *PLOS ONE* (2013), pp. 1, *et sqq*., at p.1.

or about 480,000 children a year, despite the availability of simple effective treatment',[62] and globally diarrhoeal diseases are considered as the second leading cause of the premature demise of children under five years.[63]

4. Concern about Animal Welfare

Injection of growth promoters into MPA raises the question of animal welfare. Reuter's investigations divulge that cattle injected with a growth stimulant named Zilmax were found to have an exceptionally physical vulnerability and are more susceptible to death than those that were not exposed to such medications.[64] This vulnerability can be witnessed in Bangladesh when some of such animals suddenly die at the marketplace or at the farm, and sometimes electric or manual fans are openly used at the marketplace to prevent the unexpected death of their animals. Animal Welfare Institute, a Washington based charitable organization which works for minimizing pain and fear inflicted on animals by humans, logically opposes the sub-therapeutic usage of antibiotics in farm animals, and encourages use of antibiotics for diseased animals observing that 'untreated illness can cause pain and suffering' which undermines the notion of animal welfare.[65] A recent comprehensive study[66] of six Asian countries including Bangladesh points out the economic and social benefits of integrating animal welfare policies in livestock businesses. The benefits include: (i) treating animals humanely; (ii) saving human lives; (iii) reducing health care costs; (iv) preventing animals' premature deaths; (v) strengthening reproductive capability; (vi) gaining and maintaining consumer confidence; (vii) becoming responsible citizen; and (viii) avoiding unfair means in business. Theoretically, Bangladesh supports enhancing animal welfare,[67] though practice tells another story. Our field survey finds that many of the MPA (sacrificial animals) are given antibiotics targeting the Eid-ul-Adha as alluded to earlier, and the drug sellers warn the users that the animal so treated must be sold within a certain period of time (say, three months) of the first dose of such medications. Otherwise, the animal will die suddenly and such deaths occur.

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[62] UNICEF, "Diarrhoeal Disease", October 2019, available on the Internet at <https://data.unicef.org/topic/child-health/diarrhoeal-disease/> (last accessed on 19 January 2020).

[63] ICDDRB, "Cholera and other Diarrhoeal Diseases", available on the Internet at <https://www.icddrb.org/news-and-events/press-corner/media-resources/cholera-and-other-diarrhoeal-diseases> (last accessed on 19 January 2020); Talukdar et al., "Antimicrobial Resistance, Virulence Factors", *supra* note 62, at p. 7; Christa L Fischer Walker, Igor Rudan, Li Liu, Harish Nair, Evropi Theodoratou, Zulfi qar A Bhutta, Katherine L O'Brien, Harry Campbell, and Robert E Black, "Global Burden of Childhood Pneumonia and Diarrhoea", 381 *Lancet* (2013), pp. 1405 *et sqq*., at p. 1405.

[64] Julia Calderone, "The Way Some Meat Producers Fatten up Cattle is More Bizarre than You Think", Business Insider, 6 April 2016, Tech News.

[65] Animal Welfare Institute, "Position Statement on the Use of Antibiotics in Animals Raised for Food" available on the Internet at <https://awionline.org/sites/default/files/uploads/documents/fa-statementonantibiotics-111414.pdf> (last accessed on 27 December 2019).

[66] Michelle Sinclair, Claire Fryer and Clive J. C. Phillips, "The Benefits of Improving Animal Welfare from the Perspective of Livestock Stakeholders Across Asia", 9(4) *Animals* (2019), pp. 1-17.

[67] *Ibid*, at p. 1.

The thirst for money outweighs the fear of animal's death. This is so because, hundred percent of the interviewed individual farmers admitted to us that despite being aware of the possibility of sudden death of their animals, they continued to use the antibiotics for furthering profits.

5. Environmental Pollution

Depending on the exposure, doses and types of medicines administered, a significant portion of the antibiotics escapes the metabolism process of the animals and ends up in the environment, soil and water surfaces in the form of urines and feces through either wastewater discharge from animal farms or utilization of manures as fertilizer,[68] which has a paramount contribution to environmental pollution.

The unprofessional, unethical and above all illegal antimicrobial use is an overwhelming threat to developing nations where most people are vulnerable to drug-resistant infectious diseases. Nonetheless, very few scientific studies have been carried out to assess the extent of animal microbial use in low and middle-income countries.[69] This makes it extremely difficult to accurately determine the level of contribution of MIA used in MPA to the human and environmental harm at hand.[70] A similar paucity of legal research addressing the issues in question exists in impoverished countries including Bangladesh. The present study aims to examine the regulatory weaknesses in combating the AMR in Bangladesh.

IV. Prohibitions on the Use of Antibiotics in Meat Producing Animals

The main legislation for combating AMR in Bangladesh is the Fish Feed and Animal Feed Act 2010 (FFAFA2010). Imposing a complete ban on the use of antibiotic in animal feed, s14 (1) of the FFAFA2010 provides that '[a]ny harmful chemicals including antibiotic … cannot be used in fish feed and animal feed.' Section 14(2) makes any violation of s14(1) a crime under this law, meaning that only criminal remedy will be available.

One may argue that s14(1) does not prohibit injection of MIA, as the section prohibits 'use in feed'. A literary approach to interpretation of s14(1) may present a misguiding meaning to some users of MIA that it keeps injection outside of its purview. However, a purposive approach certainly encompasses injection for growth promotion of MPA within the scope of this proscription.[71] We therefore accept that injection of MIA in MPA is also prohibited when used for growth purposes. However, it is a welcome development that the apparent ambiguity has been clearly addressed in the Animal

[68] Hua and Cheng, "Health Risk", *supra* note 31, at p. 6.
[69] Roess et al., "Household Animal and Human Medicine", *supra* note 32, at p. 574.
[70] Grace, *Review of Evidence on Antimicrobial Resistance*, *supra* note 21, at p. 7.
[71] For an application of purposive approach, see *Adler v George* (1964) 2 QB 7.

Welfare Act 2019 (Bangladesh) (AWA2019). Section s6(1)(h) of the AWA2019 provides that intentional and unnecessary feeding, injecting or inserting through the anus or genitalia or attempting to do so any drug or substance which is harmful or not applicable to the animal shall be treated as unnecessary cruelty to animals. Any breach of s6(1)(h) shall be a crime under s16(a) of the AWA2019. This prohibition applies to all animals, reared for domestic or commercial purposes regardless, however, one can hardly find any enforcement of these statutory proscriptions. Apart from the lack of enforcement, there are specific flaws in the articulation of prohibitions and penalties as will be discussed below.

V. Impediments to Enforcement of Prohibitions against Misuse of Medically Important Antimicrobials in Meat Producing Animals

1. Hindrance to Access to Justice

The sixteenth goal of the UN Sustainable Development Goals adopted in 2015 pledges to ensure access to justice for all by 2030.[72] The term access to justice encompasses a broad spectrum of justice mechanism including both the procedure and the remedy. The notion of access to justice fundamentally incorporates the literal meaning of having access to the justice system to seek remedy against unlawful conduct. Section 18 of the FFAFA2010 dictates the process of acceptance of a criminal case against any contravention of its s14(1) which contains the prohibitions in question. Section 18 of the FFAFA2010 states that 'without any written complaint of the Director-General or empowered officer, no court shall accept any case for trial under this law.' Section 18 of the AWA2019 imposes a similar restriction on the enforcement of the legislation by the general public. This restriction precludes victims of the misuse of MIA from access to justice by creating a strict barrier. Getting protection of law is a constitutionally recognized fundamental right of the people of Bangladesh.[73] Also, it goes against an established principle of the rule of law that every person must have access to justice to get his/her legitimate claim heard by a competent court.[74]

This was perhaps one of the reasons prompting lodgment of a writ petition with the High Court Division of the Supreme Court of Bangladesh seeking a complete ban on selling MIA without prescription.[75] Therefore, the restriction on the public access to justice against breaches of the FFAFA2010 and the AWA2019 should be removed.

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[72] UNDP Bangladesh, "Sustainable Development Goals (SDGs)", available on the Internet at <http://www.bd.undp.org/content/bangladesh/en/home/sustainable-development-goals.html> (last accessed on 11 January 2020).

[73] *Constitution of the Peoples Republic of Bangladesh*, Article 31.

[74] Sekander Zulker Nayeen, "Three Dimensions of Access to Justice for Achieving SDGs, The Daily Star, 19 March 2019, Law & Our Rights page.

[75] Staff Correspondent, "Prescription Now Must for Antibiotics", The Daily Star, 26 April 2019, Front page.

2. Weak Natures of the Offence

Although the violations in question are crimes, s20 of the FFAFA2010 states that the crimes committed under this Act will be non-cognizable and bailable. An identical provision is contained s19 of the AWA2019 in relation to the offenses thereunder. This paper argues that considering the long-term serious effects of antibiotics on human health, life and environment alongside animal cruelty, the offenses in question under the FFAFA2010 and the AWA2019 should be made cognizable and non-bailable. The recommended cognizable and nonbailable nature of the offense may initially be enforced against only commercial misusers of MIA used in farm animals, excluding innocent individual violators who occasionally apply MIA in their domesticated cattle used for the agrarian work. Farms are defined in s2(5) of the AWA2019 as any establishment where five or more of the same or different kinds of animals are reared for business purposes. This definition of farm sounds better than that provided in s2(3) of the FFAFA2010, which states that ‘‘Farm’ means a hatchery of fisheries and livestock, nurseries, breeding farms and commercial farms of fisheries and livestock.’ The definition in the above s2(5) of the AWA2019 may be followed in making the offenses cognizable and nonbailable. The justification for being harder on commercial offenders should be that they commit the offenses at a large scale and thereby cause greater harm, the prevention of which needs a stronger legal threat.

Given the allegation of widespread corruption against the judiciary of Bangladesh,[76] and the financial ability of the commercial violators to hire top-level lawyers, it may not be difficult for them to manage bails and continue their ill practice for profits. The ‘non-cognizable’ nature of the offense is an issue as it restricts enforcement authorities to take immediate actions against the offense. This is because both ‘cognizable’ and ‘non-cognizable’ must follow its meanings provided in The Code of Criminal Procedure, 1898 (Bangladesh) (CrPC1898). In accordance with the defining feature of a ‘non-cognizable offence’ as described in s4(n) of the CrPC1898, the police may not arrest the accused without arrest warrant, whereas they may do so under its s4(f) if the offense is ‘cognizable’.

In view of the grave extent of the problem, a preexisting pressure of getting apprehended immediately should exist for the efficacy of the law. In addition, s155(2) of the CrPC1898 unambiguously pronounces that no ‘police-officer shall investigate a non-cognizable case without the order of a Magistrate of the first or second class having power to try such case’, a reversed provision is contained s155(3) for cognizable offenses. This distinction is affirmed by the Madras High Court in the Public

[76] Tasmiah Nuhiya Ahmed, “Corruption: Name of a Fear and Reality”, New Age, 13 September 2018, Opinion page. See some examples of the corruptions of the judges: Senior Correspondent, “Judge Was Influenced to Acquit BNP’s Tarique of Money Laundering Charges, Says Law Minister”, BDNews24, 21 July 2016, Bangladesh page; Star Online Report, “Ex-judge Now living in Malaysia: ACC Quizzes 2 of His Stenographers”, The Daily Star, 23 January 2014, available on the Internet at <https://www.thedailystar.net/ex-judge-now-living-in-malaysia-8115>.

Prosecutor vs Ratnavelu Chetty[77] case. This is yet another hindrance to taking prompt action against an alleged contravention of the FFAFA2010 and the AWA2019. All this begs to make the crime cognizable and nonbailable.

3. Low Punishment

The FFAFA2010 prescribes a single set of penalties for any crimes committed thereunder. Stipulating the penalties, s20 of the FFAFA2010 provides that any person who commits an offense under this legislation will be punished with imprisonment of a term not exceeding one year, or a maximum fine of BDT50,000 (US$ 581) or with both. The penalties ordained in s16(a) of the AWA2019 are even lighter, as it prescribes maximum 6 months imprisonment and Tk10,000 (US$ 116) as the highest limit of fine, which applies to the offenses under s6(1)(h) and (3) discussed earlier. These punishments seem inadequate compared to the gravity of the offenses, and would be ineffective to create an effective deterrence.

Recognizing the need for substantial punishments against violations of health laws, the World Health Assembly (WHA) has urged the member states to strengthen their regulation by imposing tougher penalties where needed (WHO, 2001). The triviality of the punishments in question becomes clear when compared with the penalties prescribed by the Food Safety Act 2013(FSA2013) (Bangladesh) which ordains maximum five-year imprisonment or a fine not exceeding BDT1.0 million (US$ 11627) with a minimum of BDT0.5million (US$ 5814) or with both (FSA 2013, s23). Notably, these penalties can be awarded to a first time offender, whilst for repeated offenders, the penalties are even higher — five-year imprisonment or a fine of BDT2.0 million (US$ 23256) or both (FSA 2013, s23).

Unlike the FSA 2013, there is no separate penalty provision for recidivism under the FFAFA2010 or the AWA2019, nor is there any minimum penalty. We regard that the offenses under the FFAFA2010 are in no way less significant than their equivalents in the FSA2013. With a view to curtailing the judicial discretion and giving a strong signal to potential violators of the law, we recommend that a minimum threshold of fines should be set up, and fines should not be an alternative to imprisonment. This is because the offenders can get rid of liability by paying only part of their profits made illegally causing serious harm to others.[78] This is necessary to redress the MIA problem.

[77] (1927) 52 MLJ 210. Notably, both India and Bangladesh inherited the same CrPC1898 from the British colonial rule.
[78] Ashif Islam Shaon, "National Food Safety Day: What the Government is Doing to Ensure Food Safety", Dhaka Tribune, 2 February 2019, Bangladesh.

4. Lack of Coordination among the Responsible Ministries

Enforcement is certainly a bigger problem[79] compared to prohibitions. Multiple agencies are responsible for enforcement of the FFAFA2010, and a serious lack of coordination between them exists.[80] It means that they are neither independent nor collective in discharging their responsibilities. The Ministry of Health and Family Welfare is in charge of the regulation of pharmacies including the sale of antibiotics without prescription, whilst the Ministry of Industry is responsible for the quality control of animal feed and for checking the standard through Bangladesh Standards Testing Institution (BSTI). The control and monitoring of farms concerning the use of antibiotics in animal agriculture is vested in the Ministry of Livestock and Fisheries, whereas the Ministry of Establishment retains the power to run and oversee the operations of the mobile courts which are currently a major, if not the main, actor in the FFAFA2010 and the AWA2019 enforcement regime. An uncoordinated effort of multiple agencies to enforce any law can hardly be successful anywhere, let alone in Bangladesh, where the lack of accountability in almost every sector is the nation's most critical problem. When the responsibilities are apparently distinct, they could be overlapping in most cases, which warrant coordination for effective enforcement. We therefore recommend that a well-coordinated initiative should be undertaken to achieve the objectives of the two pieces of legislation (FFAFA2010 and AWA2019) by preventing deliberate and illegal misuse of MIA through a successful enforcement regime. As the first step to this end, a coordination body can be formed embracing representatives from all of the four relevant ministries that can be headed by an independent expert from the academia or an appropriate professional body. If the formation of a new body seems cumbersome for any reasonable ground whatsoever, the coordination responsibility can be assigned to the recently formed Bangladesh Food Safety Authority (BFSA).

5. Insufficient Number of Mobile Courts

As published in the 2016-17 annual report of the Ministry of Fisheries and Livestock, only 44 mobile courts were administered in a year throughout the country which is made of 64 districts living 160 million people. It means every district did not see even a single court in a year time. The number of the mobile courts currently in operation are thus extremely insufficient contributing to inadequate vigilance over the wrongdoings across the country. These courts may not make their way to the remote rural areas where most of these crimes occur, owing to lack of regulatory resources compared

[79] S. M. Solaiman & Abu Noman Mohammad Atahar Ali, "Extensive Food Adulteration in Bangladesh: A Violation of Fundamental Human Rights and the State's Binding Obligations", 49 *Journal of Asian African Studies* (2014), pp. 617 *et sqq.*, at p. 618-629.

[80] S. M. Solaiman & Abu Noman Mohammad Atahar Ali, "Rampant Food Adulteration in Bangladesh: Gross Violations of Fundamental Human Rights with Impunity", 14 *Asia-Pacific Journal of Human Rights and the Law* (2013), pp. 29 *et sqq.*, at p. 59.

to the vast areas needing the courts' visits. More importantly, the mobile courts imposes insignificant penalties. The Supreme Court of Bangladesh has expressed concerns about the triviality of punishments, predominantly fines without imprisonment, being awarded by the mobile courts.[81] Only a few cases reach the regular courts system, and public can hardly see any judicial verdict on such a case perhaps because of inordinate backlog in the judiciary where more than 3.58 million cases are now pending across the country.[82]

6. Corruption

There is no denying the fact that corruption is widespread in Bangladesh.[83] Bangladesh is 'the most risky country in terms of bribery threats in South Asia' as Trace International, a US-based organization, has published in November 2019 in its 'Trace Bribery Risk Matrix 2019'.[84] According to the Transparency International Bangladesh (TIB) Bangladesh is the second most corrupt among the countries in the South East Asian Region.[85] Although, the corruption is still very high, the situation seems to be gradually improving following current initiatives taken by the government against irregularities. Food safety is one of the areas where corruption prevails, as reported by TIB which finds that 'food adulterators manage food inspectors, field officers and custom officials with unethical transactions which ranges from BDT500-10000 [US$6-116]'.[86] Our empirical data also supports the claim of TIB that sometimes corrupt government officials entrusted with the regulatory responsibility let the culprits continue their business by using MIA in MPA for making unethical profits in return for bribe. Further, our field investigations through interviews reaffirm the truth in bribery allegations when several farmers admitted that they were threatened by officials that they will not receive any loans if they do not pay bribes. Farmers are heavily dependent on borrowings for animal farming. Such a situation prompted the High Court Division of the Supreme Court of Bangladesh to issue rule in May 2019 ordering the country's Anti-Corruption Commission to look into the matter and asking BFSA

[81] Staff Correspondent, "Mobile Court Can't Convict Arrestee Without Due Procedure: HC", Daily Sun, 29 November 2016, available on the Internet at <https://www.daily-sun.com/amp/post/187903> (last accessed on 11 August 2020)
[82] Staff Correspondent, "Over 35 Lakh Cases Pending in Courts, The Daily Star, 19 June 2019, City page.
[83] Abu Noman Mohammad Atahar Ali & Shahnewaj, "Improper Labelling of Manufacturing and Expiry Dates of Food: A Legal and Regulatory Study of Food Quality and Food Waste in Bangladesh", 18(1) *Australian Journal of Asian Law* (2017), pp. 1 *et sqq*., at p. 5; Ahmed, "Corruption", *supra* note 77.
[84] Star Online Report, "Bribery Threat Risk High in Bangladesh: Report", The Daily Star, 14 November 2019, available on the Internet at <https://www.thedailystar.net/bangladesh/trace-bribery-risk-matrix-2019-bangladesh-faces-highest-danger-1827022> (last accessed on 11 August 2020).
[85] Iftekharuzzaman, "Bangladesh Descends in Corruption Ranking: Zero Tolerance - What Next?", (TIB, 30 January 2019), available on the Internet at <https://www.ti-bangladesh.org/beta3/index.php/en/articles-op-eds/5762-bangladesh-descends-in-corruption-ranking-zero-tolerance-what-next> (last accessed on 11 August 2020).
[86] TIB, "TIB Urges Effective Implementation of Laws For Ensuring Food Safety", available on the Internet at <https://www.ti-bangladesh.org/beta3/index.php/en/activities/4242-information-3-column-2-food-safety-3> (last accessed on 11 January 2020).

and Bangladesh Standards Testing Institution (BSTI) to immediately take step against milk adulteration and submit a detailed report back to the Court.[87] Anti-Corruption Commission-Bangladesh needs to be proactive to curb corruption. If the regulators allow irregularities in exchange for bribes, who will then prevent the misuse of MIA and who will watch the watchers?

7. Lack of Regulatory Human Resources

As we have found during our filed investigations, there are around 150-200 animal farms in each Upazilla in most districts (Bangladesh has 492 Upazilas, in its 64 districts, as the second lowest tier of local government). However, only 5-6 officials in each Upazila Livestock Office are assigned the responsibility to monitor such a vast number of farms. For example, we randomly visited 10 MPA farms in Netrokona Sadar Upazilla that are carrying out business to produce and supply meats across different districts. We found that the law enforcement agencies regularly visit only half of those firms, whilst the remaining half witness government officials' visits only occasionally. There seems to be only two magistrates for each Upazila who are overburdened with other tasks to deal with, making the prevention of misuse of MIA less significant compared to the urgency and immediacy of other jobs they need to do, in their preference.[88] We also visited several livestock offices of the government and found very few officials to cooperate with us for this research. A member of the BFSA in February 2019 admitted the shortage of human resources as well as necessary scientific equipment affecting the proper operations of the regulatory agency at the Upazila level.[89] The health minister can realize the problem and points out that addressing this issue will require a multi-sectoral approach,[90] bringing together veterinary surveillance, raising public awareness and strengthening the national regulatory regime – resembling the 'One Health' approach. This realization is appreciable, however, due attention should be given to the need for increasing human resources.

8. Limitations in Technical Facilities and Human Resources Training and Targeting Marketplace

Whether MIA has been used in a particular animal is an issue of scientific evidence, unless the user is caught red handed, which would not be always easy to do so. Alongside arresting the wrongdoers on the spot, emphasis should be given to identify those animals in the physical marketplace. It would work as deterrence if the culprits know beforehand that their animals will be tested in the marketplace, so they will find it difficult to sell them. They will then realize that natural growth of their MPA will be more profitable and safer to sell. Targeting market would be an efficient way of combatting this

[87] Mizanur Rahman, "HC: No One Will Be Allowed to Toy with People's Lives", Dhaka Tribune, 15 May 2019, Bangladesh page.
[88] Abu Noman Mohammad Atahar Ali, "Manufacturing Unsafe Foods in Bangladesh: A Legal and Regulatory Analysis" (Ph.D. thesis on the file at the University of Wollongong, 2013), p. 368-369.
[89] Shaon, ""National Food Safety", *supra* note 79.
[90] Afrose Jahan Chaity & Mehedi Al Amin, "Lead, Pesticides, Antibiotics Found in Milk", Dhaka Tribune, 10 February 2019, Bangladesh page.

problem in that some of the sellers had to use electric fans for their artificially inflated animals even in the open market. To conduct this sort of operations at the MPA (cattle) market, regulators need adequate number of trained persons to take samples, and sufficient number of laboratories to carry out the test. At the time of taking sample, where instant testing is not possible, the personal details with full address of the seller must be noted down to sue them subsequently if test results are positive. Scientific equipment and trained persons are imperative to cheek the AMR problems.[91]

VI. Public Awareness of AMR Harm and Alternative Feeds

As alluded to earlier, many farmers are unaware of the harm associated with the excessive use of MIA. The government as well as non-governmental organizations (NGOs) should use electronic and press media to create public awareness. Along with this publicity, alternative animal feeds that are not harmful should be popularized. For example, some herbal natural feed additives such as oregano, du-sacch, quiponin, garlic and thyme can serve as potential substitutes for antibiotic growth booster in broiler production.[92] Non-therapeutic alternatives can be composed of enzymes, organic acids, probiotics, prebiotics, herbs, and etheric oils and immune-stimulants that possess the ingredients to present us with safe and nourishing animal feeds.[93] Probiotics, prebiotics and symbiotic are beneficial micro-organisms known to help develop gut bacterial flora,[94] which offer stronger immunity by preventing diseases through keeping the harmful microbes away.[95] This in turn promotes digestion and enhances nutrient use efficiency in MPA.[96] Further, probiotics appear to be useful antibiotic feed replacements in both livestock as an environment-friendly means of eliminating pathogens.[97] Well-funded and firmly committed comprehensive research projects have to be engaged in discovering viable alternative growth promoters as substitutes for MIA that can significantly contribute to eradicating AMR.

Appreciably, modern science has invented poultry feed made with several herbal leaves which can fatten the poultry very rapidly causing no harm to consumers or environment. For example, Demir et al. finds garlic and ginger as natural growth promoters that can be potential alternatives for common

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[91] Grace, *Review of Evidence on Antimicrobial Resistance*, *supra* note 21, at p. 13, 19.
[92] Chowdhury et al, "A Review on Antibiotics", *supra* note 20, at p. 28.
[93] *Ibid.*
[94] *Ibid.*
[95] Economou & Gousia, "Agriculture and Food Animals", *supra* note 33, at p. 55.
[96] Md. Iqbal Hossain, Mohammad Sadekuzzaman & Sang-Do Ha, "Probiotics as Potential Alternative Bio-control Agents in the Agriculture and Food Industries: A Review", 100 *Food Research International* (2017), pp. 63 *et sqq*., at p. 63-64.
[97] L Sorroza, D Padilla, F Acosta, L Román, V Grasso, J Vega, and F Real, "Characterization of the Probiotic Strain Vagococcus Fluvialis in the Protection of European Sea Bass (Dicentrarchus Labrax) against Vibriosis by Vibrio Anguillarum", 155 *Veterinary Microbiology* (2012), pp. 369 *et sqq*., at p. 369; *Ibid.* at p. 69.

artificial growth promoters like antibiotics.[98] Hossain, Khairunnesa & Das[99] invented a non-antibiotic growth promotor namely "grow power" which can be used in commercial broiler diet. Although these feeds seem to be a potential solution, very few farmers are aware of this alternative due mainly to government's failure to properly publicize the ingredients and benefits of the new product. The government as well as NGOs should invest more in familiarizing this viable substitute, and in creating alternatives for other animals.

VII. 'One Health' Approach to Combat Antibiotic Use in Meat Producing Animals

WHO has recently devised the concept of 'One Health' and has defined as 'an approach to designing and implementing programs, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes'.[100] Conceivably, the term 'one' implies unification or integration of several different areas, entities or individuals for working together. In our present context, a 'One Health' approach embraces food safety regulation, controlling of zoonoses (diseases that can spread between animals and humans, such as flu, rabies and Rift Valley Fever), and fighting AMR.[101] The unification of several actions is warranted in order to strengthen the efforts against the evil utilizing synergy benefits. The relevance of this consolidated initiative in the present article can be understood from the fact that several of 'the same microbes infect animals and humans, as they share the eco-systems they live in',[102] which necessitates combined and well-coordinated approach to designing and implementing programs targeting effective and efficient fight against any potential harm associated with those medications.

WHO and several other international agencies such as FAO, World Organization for Animal Health (OIE) in cooperation with numerous individual countries aggregated and established a multi-sectoral and collaborative action plans to attain enhanced public health outcomes and address the predicament of AMR.[103] Since the countries in the South East Asia Region (SEAR) are lagging behind their counterparts in other regions, the synergistic approach developed under the One Health umbrella provides a benchmark for these countries to achieve, while keeping in mind their economic, social and environmental differences. As a facilitator, the WHO South East Asia Regional Office 'is committed to

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[98] Emre Demir, Şenay Sarica , M. A. Özcan and M. Suiçmez, "The Use of Natural Feed Additives as Alternatives to an Antibiotic Growth Promoter in Broiler Diets", 69(3) *Archiv fur Geflugelkunde* (2005), p. 110 *et sqq*., at p. 110.

[99] MF Hossain, M Khairunnesa, and SC Das, "Use of Non-Antibiotic Growth Promoter "Grow Power" in Commercial Broiler Diet", 44(1) *Bangladesh Journal of Animal Science* (2015), pp. 33 *et sqq*., at p. 33-38.

[100] WHO, "One Health", September 2017, available on the Internet at <https://www.who.int/features/qa/one-health/en/> (last accessed on 11 January 2020).

[101] *Ibid.*

[102] *Ibid.*

[103] WHO, "Global Framework for Development & Stewardship to Combat Antimicrobial Resistance: Draft Roadmap", published 12 May 2017, available on the Internet at <https://www.who.int/publications/m/item/global-framework-for-development-stewardship-to-combat-antimicrobial-resistance-draft-roadmap> at p. 5 (last accessed on 11 August 2020); Collignon & McEwen, "One Health - Its importance", *supra* note 23, at p. 13.

ensure that national action plans are fully implemented across the region and compliance with the global action plan is achieved'.[104] A noteworthy conference, held in Chittagong-Bangladesh in March 2008 via the One Health network, established a platform namely, 'OH Bangladesh' whereby physicians, veterinarians, professionals, scientists, environmental and social workers from 12 governments and NGOs led by Institute of Epidemiology and Disease Control Research (IEDCR) and International Centre for Diarrheal Disease Research Bangladesh (ICCDR,B), got together to promote health and welfare of all species.[105] In acknowledging the need for a systematic and integrated approach to disease prevention and control with the vision of curtailing the consequences of emerging, re-emerging and high impact infectious ailments, Bangladesh established a strategic framework for 'One Health' approach to infectious diseases in 2012,[106] which was subsequently recognized by the Ministry of Fisheries and Livestock. After that, the One Health Hub Bangladesh (OHHB) was established with focal points from Institute of Epidemiology and Disease Control and Research (IEDCR), the Department of Livestock Services.[107] The OHHB actually 'serves as a networking and coordination hub connecting people, organisations and groups involved in One Health activities in Bangladesh'.[108] The government established an Inter-Ministerial Steering Committee for One Health in 2016. OH Bangladesh played a leading role in establishing the One Health Secretariat at the government level in Bangladesh. In fact, Bangladesh is a pioneer in forming a One Health Secretariat at government level for coordination among ministries and it is well recognized worldwide as the role model for achieving progress in OH governance.[109] International OH conferences are arranged regularly in Bangladesh. Of these, the 2017 OH Conference focused on achieving sustainable development goals through joint actions and called for further strengthening of OH activities to minimize health hazards and expand its partnership with the Ministry of Agriculture and Ministry of Food along with its prevailing collaboration with the Ministry of Health and Family Welfare, Ministry of Fisheries and Livestock and Ministry of Environment and Forest.[110] Although One Health approach in Bangladesh is talking about its action plan, it is still largely confined to an avowal of advocacy, and some paperwork—not backed up by deeds, hence its implementation in practice is yet to be seen. Also, the researches carried out

[104] Editorials, "One Health Approach to Tackle Antimicrobial Resistance in South East Asia", *British Medical Journal* (2017), available on the Internet at <https://www.bmj.com/content/358/bmj.j3625> (last accessed on 11 August 2020).
[105] One Health Bangladesh, "One Health", available on the Internet at <https://onehealthbangladesh.org/one-health/> (last accessed on 6 October 2019).
[106] IEDCR, "Strategic framework for One Health Approach to Infectious Diseases in Bangladesh (Strategic Framework) (2012)", available on the Internet at <https://www.iedcr.gov.bd/pdf/files/One%20Health/Strategic_framework_for_One_Health_Bangladesh-26%20Jan.pdf> (last accessed on 11 January 2020).
[107] One Health Network South Asia, "Functions and Founding Organisations of the One Health Hub Bangladesh", available on the Internet at <http://www.onehealthnetwork.asia/node/95> (last accessed on 21 November 2019).
[108] *Ibid.*
[109] IEDCR, "Interface", *supra* note 19, at p. 3.
[110] IEDCR, "Interface", *supra* note 19.

in light of the One Health approach are so far minimal and inadequate to prevent MIA use in MPA in Bangladesh. Words need to put into action to implement One Health approach in Bangladesh.

VIII. Recommendations and Conclusions

Both our filed investigations and archival research consistently demonstrate that AMR is a serious concern in Bangladesh. It is a danger for humans, animals and environment alike. Thus the misuse of MIA produces multifarious harm. Perhaps the most fatal imminent danger is that it is rendering life-saving medications ineffective on humans, which may bring a dreadful catastrophe to the people in Bangladesh, and gradually to the humankind worldwide in the future. This is so because the problem exists in many other countries, and international trades in meats will accelerate AMR spread gradually across the globe. Having said this, we agree with the dominant view that the eradication or at least minimization of AMR can only be achieved by ensuring appropriate antimicrobial use in both humans and animals solely for therapeutic purposes based on valid prescriptions, and never for growth promotion.[111] It is to be borne in mind that responsible use of antibiotics in animal husbandry practice is now a dire need in fighting the proliferation of AMR.[112] If the misuse of MIA in MPA and its medical use in human continue to exist side-by-side, neither of the two can bring any good to the society. A wholehearted firm commitment to stopping the misuse is therefore imperative to gain any success in the regulatory initiative. With this end in view, we have formulated a number of recommendations as summarized below.

Firstly, Emphasizing prevention than cure: Public awareness of the illegality and severity of potential harm that may arise from the misapplication of MIA in MPA should be raised considerably. Although ignorance of law is not a valid excuse, the enforcers of the law must consider the demography of framers and cattle traders in Bangladesh, where their literacy level is sometimes hopelessly low. An understanding of harm and potential penalties are expected to generate a reasonable amount of deterrence. There are government offices of agriculture, food safety, animal husbandry at union, the lowest tier of local government (about 5000 unions across the country) and/or Upazila levels which should take the primary responsibility to train the rural farmers and businesspeople on the proper use of MIA and the negative effects of their misuse. This training can be conducted by local medical, veterinary, environmental officials/professionals who must be trained at the district level by experts in the relevant areas.

[111] Collignon & McEwen, *supra* note 23, at p. 3.
[112] Economou & Gousia, "Agriculture and Food Animals", *supra* note 33, at p. 50.

The supply side of the medications needs to be tightened, and the order of the High Court Division of the Supreme Court of Bangladesh, mentioned earlier, not to sell any MIA without a valid prescription must be strictly enforced, and it needs to be incorporated into legislation in due course.

Public awareness can be achieved by using electronic media as a preferred method, because there are numerous TV channels in Bangladesh and every household has a TV with a few exceptions. Newspapers can also be used. Expensive seminar and symposiums would help little because those will not be attended by existing and potential users.

Prevention can also be attained by introducing alternative feeds for fattening MPA without harm. We encourage the government as well as NGOs to invest funds in conducting research in order to invent safe feeds.

Secondly, Strengthening vigilance: From a criminological perspective of crimes, David Abrahamsens's second law of criminal behavior suggests that all human beings have more or less a natural tendency to commit crimes, and a crime (C) is committed when one's tendency (T) to commit the crime and conducive situation (S) to do so jointly overpower the person's inherent resistance (R). In an equation form, it is expressed as C= (T+S)/R.[113]

Currently the monitoring is considerably weak, and the regulators do not have enough human resources to watch out effectively. The number of personnel in regulatory agencies should be increased and their capability should be improved by imparting training and providing useful equipment. Number of testing laboratories are to be increased. For a more effective field investigation, regulators should target supply side, meaning livestock markets where those poisonous animals are sold. Such an operation will create deterrence if the misusers of MIA cannot sale their animals. Regulators can send their trained officials to take sample bloods from suspicious animals and full address of their owner/seller. Actions should be taken after carrying out laboratory tests. It is important to note that no war can be won without having to employ appropriate strategies, trained fighters, and adequate equipment.

Thirdly, Increasing mobile court number: The regular court system in the country is inundated with hundreds of thousands of pending cases. In such a situation, mobile courts are regarded as a useful tool to control the onslaught of reckless use of MIA. Mobile courts currently in operation are awfully insufficient in number. We recommend that the number be increased with well-trained magistrates to be supported by scientific officers to instantly test the presence of prohibited substance in meats, raw milk and milk products, where possible.

[113] Seymour L. Halleck, "Psychiatry and the Dilemmas of Crime: A Study of Causes, Punishment, and Treatment" (California, USA: University of California Press, 1971), at p. 161.

Fourthly, Forging coordination between regulators: Currently four different ministries of the government and several departments thereunder are responsible to regulate MIA and food safety. When more than one body is charged with the responsibility for a certain task, there must be coordination between them in order to succeed in discharging their responsibilities. Otherwise one may look to another or leave an urgent task for another to take care. Eventually the situation may sound like no one is responsible for anyone else's failure. We submit that a new coordination body should be formed. If not feasible to do so on any reasonable premise, BFSA should pay particular attention to this coordination.

Fifthly, Easing access to justice: Section 18 of the FFAFA2010 and s18 of the AWA2019 prevent general public from going to court against any violation of these pieces of legislation, because no court can accept any case for trial without any written complaint of the Director-General (of fisheries or, of livestock where appropriate) or of an empowered officer. Culturally, people of Bangladesh try to avoid courts owing to uncertainty, lengthy process, expenses, etc. People will be further discouraged to raise complaint because of this additional precondition of first going to the Director-General office located at the capital city. So, people are not allowed to lodge any complaint directly to the court, which is an unnecessary additional impediment and discouragement in the enforcement of contraventions of either of the two pieces of legislation.

Sixthly, Upgrading the nature of the offenses: Currently the offenses under s19 of both the FFAFA2010 and AWA2019 are non-cognizable and bailable, which lightens the gravity of the offenses, and it offers comfort to the offenders. We recommend changes in the softness by making them cognizable and nonbailable crimes having regard to the extensity of, and dishonesty in, the wrongdoings and severity in consequences of the offenses. Otherwise, police officers can neither arrest such offenders nor investigate the offenses without a written warrant from the competent magistrate. This recommendation applies to only commercial misusers of MIA (rearing five of more animals) and recidivists, excluding individual peasants who may apply this medication occasionally to strength their cattle for agrarian works.

Seventhly, Clarifying the nature of liability: The articulation of criminal liabilities under the FFAFA2010 (s14) and AWA2019 (s6, s16) do not amount to be definitions of the offenses, rather expressions of prohibitions. So there is no mention of the elements of the offense, such as actus reus and mens rea or defenses. In such an ambiguity, the prosecution may argue that these are absolute liability provisions, by contrast the defense would be inclined to counter argue for mens rea requirements relying on common law principles of the presumption of mens rea requirement[114] to be proven by the state. The presumption is that, if the section of a statute creating the offense is silent about

[114] *He Kaw Teh v R* (1985) 157 CLR 523 (High Court of Australia); *Sweet v. Parsley* [1970] AC 132.

mens rea requirement, then the court will presume that an appropriate mens rea should be considered as a constituent element of the offense, and the presumption is rebuttable.[115] The ambiguity in the FFAFA2010 and the AWA2019 may ultimately favor the accused depending on the judges' approach. We argue that such a vagueness would be unhelpful for conviction, and recommend that the crimes should be of strict liability with a single defense of honest and reasonable mistake of fact. This will help both parties – innocent accused to avoid liability and victims of dishonest users of MIA to get a remedy or justice.

Eighthly, Compensating victims: Both the FFAFA2010 (s19) and AWA2019 (s16(A) read with s6(1)(h) and (3)) impose only criminal liability, and there no explicit provision that the victims can be compensated from the amount of criminal fines. Also, the amounts of fines prescribed in these pieces of legislation are too little to be considered as compensation even if permitted to pay to the victims. The maximum fine under s20 of the FFAFA2010 is BDT50,000 (US$ 581), whereas the fine is any amount not exceeding BDT10,000 (US$ 116) under s16(a) of the AWA2019 with no minimum amount in either of the two fines. It is inconceivable why the AWA2019 has prescribed even a lower fine. We recommend that an option of civil liability can be introduced alongside the criminal liability. Alternatively, the increased amount of fines as recommended below can be made available for compensation to victim. As widely believed and practised, an additional liability will generate deterrence.

Ninthly, Increasing penalties: The penalties permitted under FFAFA2010 (s20) and AWA2019 (s16(a)) are respectively imprisonment not longer than 1 year or a fine not exceeding BDT50,000 (US$ 581), or both and maximum 1 year incarceration or a fine up to BDT10,000 (US$ 116) or both. The options suggest that a convict may end up with any small amount of pecuniary penalty without any imprisonment, depending on the court's discretion. We argue that the penalties are inherently inadequate and that the judicial discretion may render it completely useless, because there is no minimum limit. Only a punitive amount, rather than any small amount, of fine can be a substitute for a prison term. Such penalty provisions are unlikely to create effective deterrence. There are no standard sentencing principles, nor is there any practice of holding sentencing hearing separately in Bangladesh. Given the widespread allegations of corruptions against judges as alluded to earlier, we submit that the penalties should be increased and the unrestrained judicial discretion in sentencing should be curtailed to deliver justice to the society.

Tenthly, Adopting 'One Health 'approach: 'One Health 'approach is essentially a WHO term recognizing the involvement of various disciplines and government departments in protecting health and food safety. It solicits combined initiatives putting all relevant arms of regulation or administration

[115] *Ibid.*

together to fight the evil harming public health and food safety. The concern about AMR is intrinsically connected with human health, life and food safety. We therefore agree with this approach and recommend its adoption to forge coordination among the regulators responsible for prevention of AMR.

Eleventh, Protecting environment: Environmental activist should be proactive. We have shown that excessive use of MIA in MPA damages environment in addition to harming the animals themselves and humans. There are numerous NGOs in the country whose prime responsibility is to protect environment and prevent pollution. They must come forward to create public awareness against environmental pollution, and mobilize them to launch organized movement against the polluters. The government has a separate ministry, the Ministry of Environment, Forest and Climate Change, devoted to environmental protection and development. The avowed mission of the Ministry is 'ensuring sustainable environment for the present and future communities of the country through conservation of habitat and biodiversity, controlling environmental pollution, combating climate change, developing forest resources and managing sea resources'.[116] Therefore, the Ministry has the responsibility to protect environment from the damaging effects of MIA.

Finally, addressing any problem at an early stage is generally beneficial than waiting for its aggravation resulting in a colossal devastation. The AMR problem has dramatically deteriorated taking advantage of regulatory laxity and public unawareness. A further aggravation may result in a catastrophic loss of human life, health and environment, in addition cruelty to animals. Our recommendations presented above are expected to help combat the human-made disaster driven by lust for money. Although our suggestions are formulated primarily targeting the situation in Bangladesh, other nations facing a similar problem can also benefit from this research. The government as well as NGOs who are receiving funds from donor agencies for carrying out developmental, social and environmental activities should come forward without further delay to eliminate the illegal, unethical and senseless usage of MIA in MPA in the legitimate interest of the whole nation.

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[116] Ministry of Environment, Forest and Climate Change, Government of Bangladesh, "Vision and Mission", available on the Internet at <https://moef.gov.bd/site/page/5aec69ef-45e9-4260-b151-e8cbcf97caa7/ভিশন-ও-মিশন-> (last accessed 11 August 2020)